Kapilevich, M. B.

AUTHOR: KAPILEVICH, M.B. (Moscow) 20-2-1/50

TITLE: On the Problem of the Analytical Continuation of the Fundamental Solutions of an Equation of Hyperbolic Type With Singular Coefficients (K zadache analiticheskogo prodolzheniya glavnykh resheniy uravneniya giperbolicheskogo tipa s osobymi koeffitsiyentami).

PERIODICAL: Doklady Akademii Nauk SSSR, 1957, Vol. 116, Nr 2, pp. 167-170 (USSR)

ABSTRACT: In the semiplane $y > x$ the equation

(1) $(y-x)z_{xy} + \beta(z_x - z_y) + c(x,y)z = 0$, $c(x,y) \geqslant 0$, $0 < \beta < \frac{1}{2}$

is considered, where $c(x,y) = \sum_{k=0}^{\infty} c_{2k}(y-x)^{1+2k}$, $c_{2k} =$ const. Let $\bar{D}$ be a closed domain which is limited by the interval MN of the line $y=x$ and by the characteristics MP and NP of (1) starting in $M(x_1,x_1)$ and $N(x_2,x_2)$. Let $\tau(x)$ and $\nu(x)$ be 2-times continuously differentiable functions $(x_1 \leqslant x \leqslant x_2)$. Let $4c(x,y) = b^2(y-x)$, $b =$ const. Theorem: For (1) there exist unique solutions of the singular Cauchy problem

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(2) $z(x,x) = \tau(x)$, $z_\zeta(x,x) = \nu(x)$, $\zeta = -\left(\frac{y-x}{2-2a}\right)^{1-a}$, $a = 2\beta$

and of the Tricomi problems

(3) $z(x_1,y) = 0$, $z_\zeta(x,x) = \nu(x)$; $z(x_1,y) = 0$, $z(x,x) = \tau(x)$, $\tau(x_1) = 0$

which are 2-times continuously differentiable in D. These solutions continuously depend on $\tau(x)$ and $\nu(x)$, whereby all the three problems are correct of order zero (see[3]Frankl).

Theorem: The solution of (1) - (2) has the form

$$z_0 = \gamma_1 (y-x)^{1-a} \int_x^y \tau(x')\left[(x'-x)(y-x')\right]^{\beta-1} R_{\beta-1}(x'-x,y-x')dx' -$$

$$-\gamma_2 \int_x^y \nu(x')\left[(x'-x)(y-x')\right]^{-\beta} R_{-\beta}(x'-x,y-x')dx'$$

The solutions of the problems (1) - (3) are

$$z_1 = \gamma \int_{x_1}^x \nu(x')\left[(x-x')(y-x')\right]^{-\beta} \bar{R}_{-\beta}(x-x',y-x')dx'$$

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$$z_2 = k(y-x)^{1-a}\int_{x_1}^{x} \tau(x')\left[(x-x')(y-x')\right]^{\beta-1}\bar{R}_{\beta-1}(x-x',y-x')dx'$$

Here it is $\gamma_1 = \Gamma(a)/\Gamma^2(\beta)$; $\gamma_2 = \Gamma(2-a)/\Gamma^2(1-\beta)$;

$k = \Gamma(1-\beta)/\Gamma(\beta)\Gamma(1-a)$, $\gamma = k\gamma_2/\gamma_1$; R_ν and $\bar{R}_\nu$ are double power series with infinite radii of convergence, for $x'=x$ and $x'=y$ it is $R_\nu = \bar{R}_\nu = 1$. If

(4) $R_{-\beta}(x'-x,y-x') = \sum_{\nu=0}^{\infty}\sum_{s=0}^{\infty} a_{\nu s}(x'-x)^{\nu}(y-x')^{s}$ $(a_{\nu s}=\text{const}, a_{00}=1)$

then $R_{\beta-1}(x'-x,y-x')$ arises, if in (4) β is replaced by $1-\beta$. The functions $R_{-\beta}$, $R_{\beta-1}$ are strictly positive in $y>x$ and satisfy the inequalities

CARD 3/4 $R_{-\beta}(P) \leqslant \bar{I}_{-\beta}(br)$, $R_{\beta-1}(P) \leqslant \bar{I}_{\beta-1}(br)$, where

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$$r = \sqrt{(x'-x)(y-x')}\ , \quad P = P(x'-x, y-x') \quad \text{and} \quad b = 2\sqrt{\sup_{y>x} \frac{c}{y-x}}\ .$$

The proofs of the two theorems are based on the application of the fundamental solutions previously found by the author [1], [2].
Numerous conclusions are drawn from the theorems which are particularly applied to the analytical continuation of the fundamental solutions.

ASSOCIATION: Moscow Evening Institute for Metallurgy (Moskovskiy vecherniy metallurgicheskiy institut).

SUBMITTED: March 5, 1957

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16(1)

AUTHOR: Kapilevich, M.B. SOV/20-125-1-4/67

TITLE: On the Uniqueness Theorems of the Singular Problems of Dirichlet-Neumann (K teoremam yedinstvennosti singulyarnykh zadach Dirikhle-Neymana)

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 125, Nr 1, pp 23-26 (USSR)

ABSTRACT: In the halfplane $y \geqslant 0$ the author considers the equation

$$(1) \qquad u_{xx} + u_{yy} + \frac{a(r)}{y} u_y + F(r)u = 0,$$

where it is assumed that $a(r) > 0$ and $F(r)$, $r = \sqrt{x^2+y^2}$, for $y > 0$ are bounded and continuous, where in the neighborhood of $r = 0$: $a(r) = \sum_{s=0}^{\infty} a_s r^s$, $F(r) = \frac{b_o}{r} + \sum_{s=0}^{\infty} b_{s+1} r^s$, $0 < a_o < 1$. Let u and $\bar{u}$ be two solutions for which $u_\eta(x,0) = \bar{u}(x,0) = 0, u(0,0) \neq 0, \bar{u}_\eta(0,0) \neq 0$, $\eta = \left(\frac{y}{1-a_o}\right)^{1-a_o}$.

Theorem: Let $M(r)$ be an integral of the equation $rM_{rr} + \left[1+a(r)\right]M_r + rF(r)M = 0$ which is bounded in $r = 0$, and $M(0) = 1$.

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Then all solutions $u(x,y)$ of (1) belonging to the class $\mathcal{L}_2$ for $y \geqslant 0$, satisfy the relation $M(r)u(0,0) = D\int_0^{\pi} u(r\cos\theta, r\sin\theta)\sin^{a(r)}\theta d\theta$, where $\sqrt{\pi}\,\Gamma(\frac{1}{2}+\beta)D = \Gamma(1+\beta)$, $a_0 = 2\beta$.

A similar theorem holds for the mean value of $\bar{u}$. The theorems are used in order to prove a uniqueness theorem for the singular Dirichlet-Neumann problem for (1) for non-positive $F(r)$. There are 6 references, 4 of which are American, 1 German, and 1 Swedish.

ASSOCIATION: Moskovskiy vecherniy metallurgicheskiy institut (Moscow Metallurgical Evening Institute)

PRESENTED: November 18, 1958, by S.L.Sobolev, Academician

SUBMITTED: November 16, 1958

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16(1) 2

AUTHOR: Kapilevich, M.B. SOV/20-125-2-2/64

TITLE: On the Theory of Linear Differential Equations With Two Perpendicular Parabolic Lines (K teorii lineynykh differentsial'nykh uravneniy s dvumya perpendikulyarnymi liniyami parabolichnosti)

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 125, Nr 2, pp 251-254 (USSR)

ABSTRACT: In $\Omega(x\geqslant 0, y\geqslant 0)$ the author considers the equation

(1) $$u_{xx} + u_{yy} + \frac{m(r)}{x} u_x + \frac{n(r)}{y} u_y + F(r)u = 0 ;$$

$m(r) = \sum m_s r^s > 0$, $n(r) = \sum n_s r^s > 0$, $r = \sqrt{x^2+y^2}$, $0 < m_0 < 1, 0 < n_0 < 1$; $F(r)$ is bounded and continuous everywhere in Ω with the exception of the point $r=0$, where $F(r) = b_0 r^{-1} + \sum b_{s+1} r^s$. The author investigates solutions u and $\bar{u}$ for which at the boundary of Ω it holds: $u_\xi(0,y) = u_\eta(x,0) = 0, u(0,0) \neq 0$; $\bar{u}(0,y) = \bar{u}(x,0) = 0$, $\bar{u}_{\xi\eta}(0,0) \neq 0$, where $\xi = \left(\frac{x}{1-m_0}\right)^{m_0}$, and $\eta = \left(\frac{y}{1-n_0}\right)^{1-n_0}$.

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Theorem: If $M(r)$ is an integral of $rM_{rr}+\left[1+m(r)+n(r)\right]M_r+rF(r)M=0$, $M(0)=1$, then every solution $u(x,y)$ of (1) belonging to L_2 in Ω satisfies the relation $M(r)u(0,0)=\delta\int_0^{\pi/2}u(r\cos\theta, r\sin\theta)\sin^{n(r)}\theta\cos^{m(r)}\theta\,d\theta$, where $\Gamma(\frac{1}{2}+\mu)\Gamma(\frac{1}{2}+\nu)\delta=2\Gamma(1+\mu+\nu)$, $2\mu=m_0$, $2\nu=n_0$.

Two further similar theorems and a series of special cases are given.

There are 6 references, 3 of which are Soviet, 1 Italian, 1 Swedish, and 1 German.

ASSOCIATION: Moskovskiy vecherniy metallurgicheskiy institut (Moscow Metallurgical Institute-Evening School)

PRESENTED: November 18, 1958, by S.L.Sobolev, Academician

SUBMITTED: November 16, 1958

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16(1)

AUTHOR: Kapilevich, M.B. SOV/20-125-4-7/74

TITLE: On the Theory of Degenerated Elliptic Differential Equations of the Bessel Class (K teorii vyrozhdayushchikhsya ellipticheskikh differentsial'nykh uravneniy klassa Besselya)

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 125, Nr 4, pp 719-722 (USSR)

ABSTRACT: In $x > 0$, $y > 0$, $z \geqslant 0$ the author considers the equation

$$(1) \qquad \Delta u + \frac{k}{x} u_x + \frac{m}{y} u_y + \frac{n}{z} u_z + F(r)u = 0 \; ;$$

$0 < k < 1$, $0 < m < 1$, $0 < n < 1$, $r^2 = x^2+y^2+z^2$, $F(r)$ bounded and continuous except of the point $r=0$, in the neighborhood of which $F(r) = \frac{b_0}{r} + \sum_{s=0}^{\infty} b_{s+1} r^s$.

In six theorems formulated without proof and three extended tables for the values of the appearing constants the author considers several properties and the correlations of the solutions $u^{(s)}$ $(s = 0,1,\ldots,7)$ of (1). By the introduction of an averaging operator the author investigates especially the

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On the Theory of Degenerated Elliptic Differential Equations of the Bessel Class SOV/20-125-4-7/74

behavior of the mean values of the solutions on certain concentric spherical surfaces. The obtained theorems can be used for the investigation of questions of uniqueness. There are 3 tables, and 2 references, 1 of which is Soviet, and 1 American.

ASSOCIATION: Moskovskiy vecherniy metallurgicheskiy institut (Moscow Metallurgical Evening Institute)

PRESENTED: December 18, 1958, by I.N.Vekua, Academician

SUBMITTED: December 12, 1958

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AUTHOR: [redacted]

TITLE: On Mean Value Theorems for the Solutions of Singular Elliptic Differential Equations

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. Matematika, 1960, No. 6, pp. 114 - 126

TEXT: For $y \geqslant 0$ the author considers the equation

$$u_{xx} + u_{yy} + \frac{a}{y} u_y + F(r)u = 0 \quad , \tag{1.1}$$

where $0 < a < 1$, $r = \sqrt{x^2 + y^2}$, $F(r)$ be a continuous function bounded everywhere in $y \geqslant 0$ with a possible exception of the point $r = 0$, which is representable in the neighborhood of $r = 0$ by

$$F(r) = \frac{c}{r} + b_0 + b_1 r + b_2 r^2 + b_3 r^3 + \ldots \tag{1.2}$$

where b_k and c are arbitrary real numbers. The curve $y = 0$ is a regular singular-curve with the characteristic exponents $\varrho_1 = 0$ and $\varrho_2 = 1 - a$. The author investigates the mean values of the solutions u and u

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(1.3) $u_{\eta}(x,0) = 0, \quad \overline{u}(x,0) = 0, \quad \eta = \left(\frac{y}{1-a}\right)^{1-a}$

on the semicircles $\Gamma(0,r)$: $x^2 + y^2 = r^2$, $y \geqslant 0$, $0 \leq r < \infty$. Let

(1.4) $x = r\cos\alpha\,, \quad y = r\sin\alpha\,, \quad 0 \leqslant r < \infty, \quad 0 \leqslant \alpha \leqslant \pi.$

and $R(r) = \int\limits_0^{\pi} u \sin^a \alpha\, d\alpha$. Let $M(a,F,r)$ be that solution of the equation

(1.6) $G(a,F,R) = R_{rr} + \frac{1+a}{r} R_r + F(r)R = 0$

which corresponds to the characteristic exponent $\varsigma_1 = 0$ and which satisfies the condition

(1.7) $M(a,F,0) = 1$.

Then it holds

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(1.8). $$M(a,F,r)u(0,0) = D\int_0^{\pi} u(r\cos\alpha,\ r\sin\alpha)\sin^a\alpha\, d\alpha$$

where $D = \dfrac{\Gamma(1+\beta)}{\sqrt{\pi}\,\Gamma(\frac{1}{2}+\beta)}$, $\beta = \dfrac{a}{2}$.

An analogous formula is given for $\widetilde{u}$. The author discusses the special cases

(1.12) $$F(r) = -b^2$$

((1.6) is then a Bessel equation) and

(1.17) $$F(r) = \frac{c}{r} - b^2$$

(here M is a confluent hypergeometric function).

Then the equation

(2.1) $$u_{xx} + u_{yy} + \frac{m}{x}u_x + \frac{n}{y}u_y + F(r)u = 0$$

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is investigated, where $0 < m < 1$, $0 < n < 1$, and $F(r)$ is the same as above. In the region Ω $(x \geqslant 0,\ y \geqslant 0)$, the author considers solutions u and $\bar{u}$ which, on the boundary of Ω, satisfy the conditions

$$u_\xi(0,y) = u_\eta(x,0) = \bar{u}(0,y) = \bar{u}(x,0) = 0$$

$$\xi = \left(\frac{x}{1-m}\right)^{1-m}, \quad \eta = \left(\frac{y}{1-n}\right)^{1-n}$$

It is stated that it holds

$$\text{(2.2a)} \quad M(m,n,F,r)u(0,0) = \delta_1 \int_0^{\frac{\pi}{2}} u(r\cos\alpha,\ r\sin\alpha)\sin^n\alpha\cos^m\alpha\, d\alpha$$

$$\text{(2.2b)} \quad r^{2-m-n}\bar{M}(m,n,F,r)\bar{u}_{\xi\eta}(0,0) = \delta_2 \int_0^{\frac{\pi}{2}} \bar{u}(r\cos\alpha,\ r\sin\alpha)\sin 2\alpha\, d\alpha$$

Here the function M is given by (1.6) and (1.7) for a = m+n, while

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On Mean Value Theorems for the Solutions of Singular Elliptic Differential Equations

$\overline{M} = M(2-m,\ 2-n, F, r)$, $2\mu = m$, $2\nu = n$, $\delta_1 \Gamma(\frac{1}{2}+\mu)\Gamma(\frac{1}{2}+\nu) =$
$= 2\Gamma(1+\mu+\nu)$, $2(1-m)^{1+m}(1-n)^{1+n}\Gamma(\frac{1}{2}-\mu)\Gamma(\frac{1}{2}-\nu)\,\delta_2 =$
$= (4-m-n)(2-m-n)^2\ \Gamma(1-\mu-\nu)$.

Introducing in (2.1) the variables ξ, η then one obtains

(2.3) $\eta^p u_{\xi\xi} + \xi^q u_{\eta\eta} + \xi^q \eta^p F(r) u = 0$

where $(1-n)p = 2n$, $(1-m)q = 2m$. Let Δ_2 denote the region bounded by Γ_2: $\varrho^2 = x^2 + y^2 = R^2$, $x \geqslant 0$, $y \geqslant 0$ and the lines OA and OB of the axes $x = 0$, $y = 0$ ($A = A(R,0)$, $B = B(0,R)$). In Δ_2 the author considers solutions u, $\overline{u}$ of (2.3) which, on the boundary of Δ_2, satisfy the conditions

(2.4a) $u|_{\varrho=R} = f(\xi)$, $u_\xi(0,\eta) = \nu_1(\eta)$, $u_\eta(\xi,0) = \nu_2(\xi)$

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On Mean Value Theorems for the Solutions of Singular Elliptic Differential Equations

(2.4b) $\overline{u}|_{\xi=R} = \varphi(\xi)$, $\overline{u}(0,\eta) = \tau_1(\eta)$, $\overline{u}(\xi,0) = \tau_2(\xi)$.

Here let $f, \varphi, \tau_s, \nu_s$ ($s = 1,2$) be bounded and continuous on the intervals $0 \leq \xi \leq R$, $0 \leq \eta \leq R$, and let $f_\eta(A) = \nu_2(A)$, $f_\xi(B) = \nu_1(B)$, $\nu_1(0) = \nu_2(0)$, $\varphi(A) = \tau_2(A)$, $\varphi(B) = \tau_1(B)$, $\tau_1(0) = \tau_2(0)$.

It is proved that the given boundary value problems have a unique solution under certain assumptions on p,q and F(r).
There are 10 references : 2 Soviet, 3 American, 2 Italian, 2 Swedish, and 1 German.

ASSOCIATION: Moskovskiy vecherniy metallurgicheskiy institut (Moscow Metallurgical Evening-Institute)

SUBMITTED: December 12, 1958

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~~16(1)~~ 16,3500 SOV/20-130-3-1/65

AUTHOR: Kapilevich, M.B. 16

TITLE: Transformation Operators Connected With Goursat Singular Problems

PERIODICAL: Doklady Akademii nauk SSSR, 1960, Vol 130, Nr 3, pp 487 - 490 (USSR)

ABSTRACT: Let $L_p^q(\delta)$ $(p,q = 0,1,2,\ldots \infty)$ be the set of the functions $f(y)$ which are defined on δ : $0 \leqslant y \leqslant y_0$ and p-times continuously differentiable with

(1) $f(0) = f'(0) = \ldots = f^{(q)}(0) = 0$.

As the first singular Goursat problem G_p^q the determination of the solutions $z(x,y,b)$ of

(2) $xz_{xy} + az_x + bz_y = 0$ $(a \quad 0,\ b \geqslant 0)$

is denoted which are continuous in D $(0 \leqslant x \leqslant x_0,\ 0 \leqslant y \leqslant y_0)$ together with their p-th derivatives and for which

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(3) $z(0,y) = f(y)$, $z(x,0) = 0$, $f(y)$ $L_p^q(\delta)$.

Theorem 1 : Let $b_2 > b_1 \geq 0$, $b = b_2 - b_1$, $p \geq 2$, $q \geq 0$. Then it is

(4) $$z(x,y,b_2) = \frac{1}{(b)}\left(\frac{a}{x}\right)^b \int_0^y (y-t)^{b-1} e^{-a(y-t)/x} z(x,t,b_1)dt \quad .$$

To this equation there corresponds in the case $p=n$, $q \geq 0$ the expansion

(5a) $$z(x,y,b_2) = \frac{1}{(b)} \sum_{k=0}^{n} \frac{1}{k!}\left(-\frac{x}{a}\right)^k \gamma\left(b+k,\frac{ay}{x}\right) D_y^k z(x,y,b_1) + R_n$$

where $(\;,u)$ is the incomplete Eulerian Gamma function [Ref 2], $D_y^k = \partial^k/\partial y^k$ and, if $\eta = y - \theta t$, $0<\theta<1$, then it is

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$$(5b)\quad R_n = \frac{(-1)^{n+1}}{(n+1)!\,\Gamma(b)} \left(\frac{a}{x}\right)^b \int_0^y t^{n+b} e^{-at/x} D_\eta^{n+1} z(x,\eta,b_1)dt$$

Theorem 2 : For every $f(y) \in L_p^q(\delta)$ $(p \geqslant 2,\ q \geqslant 0)$ for $b_1 > b_2 > 0$, $\bar{b} = b_1 - b_2$, $c_0 \Gamma(\bar{b})\Gamma(b_2) = \Gamma(b_1)$ there hold the formulas

$$(6a)\quad z(x,y,b_2) = c_0 \int_0^1 t^{b_2-1}(1-t)^{\bar{b}-1} z(xt,y,b_1)dt \ .$$

Moreover in theorem 1 the author gives a simpler form for (5a) for the case $p = n$, $q \geqslant n$. Moreover in theorem 2 he gives the expansion for $z(x,y,b_2)$ and the corresponding remainder term as in theorem 1.

Let $v(x,y,b)$ be the solution of the problem (3) (for $p=2, q=0$) for the parabolic equation

$$(7)\quad xv_{xx} + bv_x - av_y = 0 \quad (a > 0),$$

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the singular line of which coincides with the characteristic $x = 0$ too.

Theorem 3 : Let b_2 be not positive integer; $0 \leq b_1 < 1$; $c_1 \Gamma(1 - b_1) \Gamma(1 - b_2) = -1$; $K(x,y,\xi,b_1,b_2)$ is assumed to be defined on $0 \leq \xi \leq y$ by

$$(8)\ K = c_1\, e^{a\xi/x} D_{\xi} \int_{\xi}^{?} (y-t)^{b_2-2} (t-\xi)^{-b_1} \exp\left[-\frac{a(x^2-t^2+yt)}{x(y-t)}\right] dt$$

Then it is

$$(9)\ v(x,y,b_2)a^{b_1+b_2-1} = x^{1+\overline{b}} \int_0^y Kz(x,\xi,b_1)\,d\xi$$

Theorem 4 : For $c_2 \Gamma(b_2) = a^{b_1+b_2} \Gamma(1-b_1)$, $b_2 \geq 0$ and arbitrary $b_1 \neq 1,2,\dots$ it is

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AUTHOR: Kapilevich, M.B.

TITLE: Connection Formulas for Singular Tricomi Problems 16

PERIODICAL: Doklady Akademii nauk SSSR, 1960, Vol. 132, No.1, pp. 28 - 31

TEXT: The singular Tricomi problem is the determination in $D(y > x > 0)$ of those solutions $u(x,y,\beta)$ and $\overline{u}(x,y,\beta)$ of

(1) $(y-x)u_{xy} + \beta(u_x - u_y) = 0 \quad (0 \leq a = 2\beta < 1)$

which in D are continuous with their second derivatives and which on the semilines $y = x \geqslant 0$, $x = 0$, $y \geqslant 0$ satisfy the conditions

(2) $u(x,x) = f(x)$, $u(0,y) = 0$,

(3) $\overline{u}_\eta(x,x) = f(x)$, $\overline{u}(0,y) = 0$, $\eta = -((y-x)/(2-2a))^{1-a}$,

where $f(x)$ is two times continuously differentiable on $y = 0$, $x \geqslant 0$; $f(0) = 0$.

At first the author gives connection formulas in three theorems, e.g.:

Theorem 1 : For $\beta_2 > \beta_1 \geqslant 0$, $\beta = \beta_2 - \beta_1$, $a = a_2 - a_1$, $\omega(x-y) = x - \xi$, X

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Connection Formulas for Singular Tricomi Problems S/020/60/132/01/06/064

$\varkappa_1 \Gamma(\beta)\Gamma(1/2 - \beta_2) = 2^{a}\Gamma(1/2 - \beta_1)$ it holds :

$$(4) \quad u(x,y,\beta_2) = (y-x)^{1-\beta_1-\beta_2} \int_0^x K_1(x,y,\xi,\beta_1,\beta_2)u(\xi,y,\beta_1)d\xi ,$$

where $K_1 = \varkappa_1(y-\xi)^{a_1-1}(x-\xi)^{\beta-1}F(-\beta,\beta_2,\beta;\omega)$.

Then the considered Tricomi problem is compared with the solutions of singular Goursat - problems (Ref. 1) for $yz_{xy} + \alpha z_y + \beta z_x = 0$ as well as with $yv_{yy} + \beta v_y - \alpha v_x = 0$. The author gives a series of transformation formulas. The results can be used in order to solve explicitly the considered boundary value problems in special cases.

There are 4 references: 2 Soviet, 1 American and 1 French.

PRESENTED: December 31, 1959, by I.G. Petrovskiy, Academician

SUBMITTED: December 28, 1959

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AUTHOR: Kapilevich, M. B.

16

TITLE: Mixed Boundary Value Problems for Singular Hyperbolic Equations 16

PERIODICAL: Doklady Akademii nauk SSSR, 1960, Vol. 132, No. 5, pp. 1005-1008

TEXT: Let $u(x,y,\beta,\beta')$ and $u(x,y,\beta,\beta')$ be solutions of the equation

$$(1) \qquad (y - x)\, u_{xy} + u_x - u_y = 0 \quad (0 \leq \beta < \tfrac{1}{2}, \; 0 \leq \beta' < \tfrac{1}{2})$$

which in the domain $D(0 \leq x \leq y \leq x_0)$ of the half plane $y \geq x$ belong to the class L_2 and on two boundaries of this domain satisfy the boundary conditions

$$(2a) \qquad u(0,y) = 0 \quad u(x,x) = \text{[illegible]} \quad \tau(0) = 0$$

$$(2b) \qquad \bar{u}(0,y) = 0 \quad , \quad \text{[illegible]}(x,x) = \gamma(x).$$

Let $\tau(x)$ and $\gamma(x)$ be two times continuously differentiable on $(0,x_0)$, $\eta = -\left(\frac{y-x}{2-a-a'}\right)$, $(a = 2\beta, \; a' = 2\beta')$

Theorem 1: Let $\tau_2(x) = P(x) \quad \tau_1(x)$, where $P(x)$ is an arbitrary function integrable on $(0,\bar{x}_0)$, $0 < \bar{x}_0 \leq x_0$. For the corresponding solutions

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S/020/60/132/05/09/069

Mixed Boundary Value Problems for Singular Hyperbolic Equations

u_1, u_2 of the problem (2a) for $\beta_2' > \beta_1' \geq 0$,

$$\Gamma(\beta_2')\Gamma(1-\beta_1)\Gamma(1-\beta_1')\Gamma(1-\beta_2-\beta_2')\varkappa_1 = -\Gamma(1-\beta_2)\Gamma(1-\beta_1-\beta_1')$$

then it holds the relation

$$(3)\quad u_2(x,y,\beta_2,\beta_2') = \int_0^x K_1(x,y,\xi,\beta_2,\beta_1',\beta_2,\beta_2')u_1(\xi,y,\beta_1,\beta_1')\,d\xi$$

where

$$K_1 = x_1(y-x)^{1-\beta_2-\beta_2'}(y-\xi)^{\beta_1+\beta_1'-1}D_\xi\,\Omega(\xi)$$

$$\Omega(\xi) = \int_\xi^x P(t)(y-t)^{-\beta}(t-\xi)^{-\beta_1'}(x-t)^{\beta_2'-1}\,dt,$$

$$D_x = \partial/\partial x, \qquad \beta = \beta_1 - \beta_2$$

In three further theorems and in numerous special cases the author proves similar connections between u and $\bar{u}$ for other assumptions.

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S/020/60/132/05/09/069

Mixed Boundary Value Problems for Singular Hyperbolic Equations

There are 2 references: 1 Soviet and 1 English.

PRESENTED: January 29, 1960, by S. L. Sobolev, Academician

SUBMITTED: January 27, 1960

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S/020/61/137/005/008/026
C111/C222

16.4400

AUTHOR: Kapilevich, M.B.

TITLE: Tricomi's singular problems in the neighborhood of a finite and infinite singular line

PERIODICAL: Akademiya nauk SSSR.Doklady, vol.137,no.5, 1961, 1053-1056

TEXT: In the region G $(0 \leq x \leq y \leq x_0)$ the author considers the equation

$$E(u, \beta, \beta') = (y-x)u_{xy} + \beta' u_x - \beta u_y = 0. \qquad (1)$$

The functions $u(x,y,\beta,\beta')$ and $\overline{u}(x,y,\beta,\beta')$ are called solutions of the first and second singular problem of Tricomi if (correspondingly) the boundary conditions

$$u(x,x) = \tau(x), \quad u(0,y) = \tau(0) = 0; \quad \overline{u}_n(x,x) = \nu(x), \quad \overline{u}(0,y) = 0 \qquad (2)$$

are satisfied. Let $\tau(x)$ and $\nu(x)$ be two times continuously differentiable on $(0,x_0)$. Let $\eta = -[(y-x)/(2-a-a')]^{1-\alpha}$, $\alpha = \beta + \beta' < 1$, $a = 2\beta$, $a' = 2\beta'$. By the introduction of the variables $x = x$, $s = y-x$, (1),(2) is reduced to

$$F(u, \beta', \alpha) = s(u_{xs} - u_{ss}) + \beta' u_x - \alpha u_s = 0; \qquad (3)$$

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$$u(x,0) = \tau(x), \quad u(0,s) = \tau(0) = 0; \quad \bar{u}_{\eta}(x,0) = \nu(x), \quad \bar{u}(0,s) = 0, \qquad (4)$$

where u(x,s) is the new sought function.
If U(x,s) and $\bar{U}(x,s)$ are integrals of (3) corresponding to the boundary conditions $U(x,0) = \bar{U}_{\eta}(x,0) = 1$, $U(0,s) = \bar{U}(0,s) = 0$ then

$$u(x,s) = D_x \int_0^x U(x-\xi,s)\tau(\xi)d\xi = \int_0^x U(x-\xi,s)d\tau(\xi); \qquad (5a)$$

$$\bar{u}(x,s) = D_x \int_0^x \bar{U}(x-\xi,s)\nu(\xi)d\xi = \int_0^x \bar{U}(x-\xi,s)d\nu(\xi). \qquad (5b)$$

The discontinuous Duhamel kernels U(x,s), $\bar{U}(x,s)$ are expressed by the modified incomplete Beta-functions $I_z(p,q)$ which are tabulated (Ref.1: K.Pearson, Tables of the incomplete Beta-function, Cambridge, 1904). The Duhamel resolvents of

$$(y-x)u_{xy} + \beta(u_x - u_y) - b^2(y-x)u = 0 \qquad (7)$$

are also expressed by the same functions. For this in (7) it must be put $s = y-x$, $t = x/y$, $u = s^{-\beta}v$, and in the appearing equation it must be put

$v = \sum_{n=0}^{\infty} s^{\beta+n} f_n(t)$. That yields the recurrent system

$$T(1-t)^2 f''_{m+2}(t) - (1-t)[m+\beta+1+(m+\beta+3)t] f'_{m+2}(t) + \\ +(m+2)(m+2\beta+1) f_{m+2}(t) + b^2 f_m(t) = 0, \tag{8}$$

where $m = -2,-1,0,1,2,\ldots$, $f_{-2}(t) \equiv f_{-1}(t) \equiv 0$.

From (5) it follows $\lim_{s\to\infty}[s^{\beta'}u] = \Gamma(1-\beta)/\Gamma(1-\alpha) D_x^{-\beta'} \tau(x) = T(x)$. Putting $\sigma = 1/s$, $w = s^{\beta'} u$, then (3),(4) is reduced to

$$w_{x\sigma} + \sigma^2 w_{\sigma\sigma} + (\beta' - \beta + 2)\sigma w_\sigma + \beta'(1-\beta) w = 0, \tag{9}$$

$$w(x,0) = T(x), \quad w(0,\sigma) = 0, \quad T(0) = 0 . \tag{10}$$

Theorem 1: For $\beta'_1 > \beta'_2 > 0$, $\beta' = \beta'_1 - \beta'_2$, $\mu_1 \Gamma(\beta'_2)\Gamma(\beta') = \Gamma(\beta'_1)$ the solutions $w_k = w(x, \sigma, \beta, \beta'_k)$ $(k=1,2)$ are connected by the relation

$$w(x, \sigma, \beta, \beta'_2) = \mu_1 \int_0^1 \xi^{\beta'_2 - 1} (1-\xi)^{\beta'-1} w(x, \xi\sigma, \beta, \beta'_1) d\xi \tag{12}$$

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to which in the case $T(x) \subset C_{n+1}$ $(0 \leqslant x \leqslant x_0)$ there corresponds the development

$$w(x, \sigma, \beta, \beta_2') = \sum_{k=0}^{n} \frac{(\beta')_k}{(\beta_2')_k} k!(-\sigma)^k D_\sigma^k w(x, \sigma, \beta, \beta_1') + R_n, \qquad (13)$$

where

$$R_n = \frac{(-1)^{n+1}\Gamma(\beta_1')}{\Gamma(\beta')\Gamma(\beta_2'+n+1)} \times$$

$$\times \int_0^1 \xi^{\beta_2'+n} F(1-\beta', \beta_2', \beta_2'+n+1, \xi) D_\xi^{n+1} w(x, \xi\sigma, \beta, \beta_1') d\xi.$$

Theorem 2: For $0 \leq \beta_1 < \beta_2 < 1$, $\beta = \beta_2 - \beta_1$, $\mu_2 \Gamma(1-\beta_2)\Gamma(\beta) = \Gamma(1-\beta_1)$ it holds

$$w(x, \sigma, \beta_2, \beta') = \mu_2 \int_0^1 \xi^{-\beta_2}(1-\xi)^{\beta-1} w(x, \xi\sigma, \beta_1, \beta') d\xi. \qquad (14)$$

The confluent case $z_{x\sigma} + a\sigma z_\sigma + a\beta' z = 0$ $(a > 0)$ arises from (9) if x is replaced by εx and β is replaced by $-a/\varepsilon$, and $\varepsilon = 0$. The telegraphic

equation $v_{x\sigma}+c^2v = 0$ approximates (9) for $c^2 = \beta'(1-\beta)$ in the neighborhood $\sigma = 0$.

Theorem 3: For $\beta<1, \beta'>0, c>0, \mu\Gamma(\beta)\Gamma(1-\beta) = 2c^{1+\beta'-\beta}$ the solutions $w(x, \sigma, \beta, \beta')$, $z(x, \sigma, \beta')$ and $v(x, \sigma, c)$ of the problem (10) transform by

$$w(x, \sigma, \beta, \beta') = \frac{\sigma^{1-\beta}}{\Gamma(1-\beta)} \int_0^\infty \xi^{-\beta} e^{-\sigma\xi} z(x, \xi\sigma, \beta')\, d\xi,$$

$$w(x, \sigma, \beta, \beta') = \mu \int_0^\infty \xi^{(\beta'-\beta-1)/2} K_{\alpha-1}(2c\sqrt{\xi})\, v(x, \xi\sigma, c)\, d\xi.$$

A great number of further connections is given.

There is 1 Soviet-bloc and 3 non-Soviet-bloc references. The two references to English-language publications read as follows: K.Pearson, Tables of the incomplete Beta-function, Cambridge, 1904. W.A.Al-Salam, Duke Math.J. 24, no.4, 529 (1957).

ASSOCIATION: Moskovskiy vecherniy metallurgicheskiy institut (Moscow Metallurgical Evening-Institute)

PRESENTED: November 22, 1960, by I.G.Petrovskiy, Academician

SUBMITTED: November 19, 1960

KAPILEVICH, M.B.

Goursat's singular problems in the vicinity of a zero and an infinite singular characteristic. Dokl.AN SSSR 137 no.6:1287-1290 Ap '61.
(MIRA 14:4)

1. Moskovskiy vecherniy metallurgicheskiy institut. Predstavleno akademikom I.G.Petrovskim.
(Functional analysis)

16.3500

23844

S/020/61/137/006/003/020
C 111/ C 333

AUTHOR: Kapilevich, M. B.

TITLE: Goursat's singular problems in the neighborhood of a zero and infinite singular characteristic

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 137, no. 6, 1961, 1287-1290

TEXT: In $D(0 \leqq x \leqq x_0,\ 0 \leqq y \leqq y_0)$ the author considers

$$L(z, B, C) = xz_{xy} + A(x)\, z_x + B(x)\, z_y + C(x)\, z = 0 \qquad (1)$$

where $A(x) > 0$, $B(x)$, $C(x)$ together with the second derivatives are continuous on $X(0 \leqq x \leqq x_0)$. Let $z(x,y,B,C)$ denote a solution of (1) which is twice continuously differentiable in D and for which it holds

$$z(0,y) = f(y), \quad z(x,0) = 0, \quad f(0) = 0 . \qquad (2)$$

As in the paper of the author (Ref. 1: DAN 130, No. 3, 487 (1960)), $f(y)$ is assumed to belong to the class C_p^q on $Y(0 \leqq y \leqq y_0)$.

The principle of Duhamel reads as follows: If $U(x,y)$ is an integral of (1) with discontinuous boundary conditions $U(0,y) = 1$, $U(x,0) = 0$,

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Goursat's singular problems ... S/020/61/137/006/003/020
C 111/ C 333

then

$$s(x,y,B,C) = D_y \int_0^y U(x,y-\eta)\, f(\eta)\, d\eta = \int_0^y U(x,y,-\eta)\, df(\eta). \qquad (3)$$

If $A(x) \equiv A(0) = a$, $B(x) \equiv B(0) = b$, $C(x) \equiv 0$, i. e. if $s(x,y,B,C) = s(x,y,b)$ satisfies the equation (Ref.1)

$$L(s,b) = xs_{xy} + as_x + bs = 0 \quad (a > 0) \qquad (4)$$

then $U(x,y)\,\Gamma(b) = \gamma(b,ay/x)$, where $\gamma(b,z)$ is the incomplete gamma function. The existence of the discontinuous solution $U(x,y)$ in the general case (1) is proved by successive approximation.

Theorem 1: Let $V(x,y)$ satisfy the equation $xV_{xy} + AV_x + (B_2-B_1)V_y + (C_2-C_1)V = 0$ and the discontinuous initial conditions $V(x,0) = 0$ $V(0,y) = 1$. Let $s_k = s(x,y,B_k,C_k)$ be the solution of the problem (2) for $L(s,B_k,C_k) = 0$ $(k = 1,2)$. If then $b_2-b_1 > 1$, then

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$$z_2(x,y) = D_y \int_0^y V(x,y-\eta)\, z_1(x,\eta)\, d\eta = \int_0^y V(x,y-\eta) z_{1\eta}(x,\eta) d\eta \;. (5)$$

Here the Duhamel resolvents U_1, U_2 V are connected by

$$U_2(x,y-\eta) = D_y \int_\eta^y V(x,y-t)\; U_1(x,t-\eta)\; dt \;. \qquad (6)$$

Theorem 2: Let $z(x,y, b+n+1)$ be the solution of the problem $z(0,y) = (-a)^{-n-1}(b)_{n+1}\, f^{(n+1)}(y)$, $z(x,0) = 0$ for the equation $L(z, b+n+1) = 0$, where $f(y) \subset C^{n+1}_{n+3}$. Then

$$z(b) = \sum_{k=0}^{n} (b)_k/k!\; (\frac{-x}{a})^k f^{(k)}(y) + \frac{1}{n!} \int_0^x (x-\xi)^n z(\xi, y, b+n+1) d\xi \;. (9)$$

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Let $z_e(x,y,B,C)$ denote the integral of (1) for which

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$$s_o(0,y) = f(y), \quad \lim_{y \to -\infty} s_o(x,y) = 0, \quad f(-\infty) = 0 \quad . \tag{10}$$

If $f(y)$ is given everywhere on $-\infty < y < y_0$, then for $b > 0$

$$s_o(x,y,b) = \frac{1}{\Gamma(b)} \left(\frac{a}{x}\right)^b \int_{-\infty}^{y} (y-\eta)^{b-1} \exp\left[-\frac{a(y-\eta)}{x}\right] f(\eta)\,d\eta \tag{11}$$

For investigating $s(x,y,b)$ in the neighborhood of $x = \infty$ the author introduces

$u(x,y,b) = x^{-b} s(1/x, y, b)$ and then he considers

$$\mathcal{L}(u,b) = u_{xy} + axu_x + abu = 0 \tag{12}$$

$$u(0,y) = \phi(y), \quad u(x,0) = 0, \quad \phi(0) = 0 \; . \tag{13}$$

The solution is obtained from (3), if one passes from $f(y)$ to $\phi(y)$,

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where $\phi(y)$ is defined by $\lim_{x \to \infty} \left[x^b s(x,y,b) \right] = a^b D_y^{-b} f(y) = \phi(y)$.

The solution of (12), (13) then is

$$u(x,y,b) = D_y \int_0^y U(x,y-\eta)\phi(\eta)d\eta = \int_0^y U(x,y-\eta)\, d\phi(\eta). \qquad (14)$$

Let $v(x,y,b)$ be the solution of $xv_{xx} + bv_x - av_y = 0$ $(a>0)$ with the boundary condition (2). The function $v(x,y,b)$ is also representable as Duhamel integral (3) with the kernel $\Gamma(1-b)U(x,y) = \Gamma(1-b,ax/y)$.

Theorem 3: For $c_1\Gamma(b)\Gamma(1-b_2) = \Gamma(1-b_1)$, $c_2\Gamma(1-b_1)\Gamma(1+\bar{b}) = \Gamma(1-b_2)$ and arbitrary not integer $b_1 > 0$, $b_2 > 0$, $b = b_2 - b_1 > 0$, $\bar{b} = b_1 - b_2 > -1$ it holds

$$v(x,y,b_2) = c_1 \int_1^\infty \xi^{b_1-1} (\xi-1)^{b-1} v(x\xi,y,b_1)\, d\xi \;;$$

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$$v(x,y,b_1) = c_2 x^{1-b_1} D_x \int_x^{\infty} \xi^{b_2-1}(\xi - x)^{\bar{b}} v(\xi, y, b_2)\, d\xi ,$$

while for $m = 1,2,\ldots$ $v(b)\,\Gamma(m+b) = \Gamma(b)\, x^{1-b} D_x^m \left[x^{m+b-1} v(m+b)\right]$.

There are 2 Soviet-bloc and 3 non-Soviet-bloc references. The two references to English-language publications read as follows: A. Erdélyi, Quart. J. Math. Oxford Ser., 8, No. 32, 267 (1937); W.G.L. Sutton, Proc. Roy. Soc., A 182, No. 988, 48 (1943).

ASSOCIATION: Moskovskiy vecherniy metallurgicheskiy institut (Moscow Metallurgical Evening Institute)

PRESENTED: November 22, 1960, by J. G. Petrovskiy, Academician

SUBMITTED: November 19, 1960

32312
S/020/61/141/005/003/018
C111/C444

16.3500

AUTHOR: Kapilevich, M. B.

TITLE: An effective solution of Tricomi singular problems for Chaplygin's equation

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 141, no. 5, 1961, 1030 - 1033

TEXT: The Chaplygin equation $\eta z_{\theta\theta} + z_{\eta\eta} + b(\eta) z_{\eta} = 0$, where $b(\eta) = \sum_{m=0}^{\infty} b_m \eta^m$ in the neighborhood of $\eta = 0$, has in the variables $x = \theta - 2/3(-\eta)^{3/2}$, $y = \theta + 2/3(-\eta)^{3/2}$ for $\eta < 0$ the shape

$$G[z] = z_{xy} + A(z_x - z_y) = 0, \quad (1)$$

$A = \frac{1}{6s} + \sum_{m=0}^{\infty} a_m s^{(2m-1)/3}$; $s = y - x$; $a_m = 1/4(-1)^{m+1}(3/4)^{(2m-1)/3} b_m$.

The author calls $z(x, y)$ and $\bar{z}(x, y)$ solutions of the first and second singular Tricomi problem, if these functions satisfy in $D(0 < x < y < x_0)$

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the equation (1) and the boundary conditions

$$z(x, x) = \tau(x), \ \bar{z}_\eta(x, x) = \nu(x), \ z(0, y) = \bar{z}(0, y) = 0, \qquad (2)$$

where $\tau(0) = 0$, $\tau(x)$ and $\nu(x) \subset C^2[0, x_o]$.

According to the author (Ref. 4: DAN 137, no. 5, 1053, 1961) it is sufficient for the solution of (1) - (2) to determine the discontinuous solutions of (1) with the boundary conditions

$$U(x, x) = \bar{U}_\eta(x, x) = 1, \quad u(0, y) = \bar{U}(0, y) = 0. \qquad (3)$$

In order to find U(x, y) one puts in (1) $s = y - x$, $t = x/y$ and uses in the originating equation

$$Q[z] = s(1 - t^2)z_{st} - t(1 - t)^2 z_{tt} - s^2 z_{ss} + [As(1 - t^2) -$$
$$- (1 - t)^2] z_t - 2As^2 z_s = 0 \qquad (4)$$

the set-up

$$z = U(x, y) = \sum_{n=0}^{\infty} U_n(x, y) = \sum_{n=0}^{\infty} s^{n/3} f_n(t). \qquad (5)$$

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By investigation of the recurrent system

$$L_{m+2}[f] = t(1-t)^2 f''_{m+2}(t) - \frac{1}{6}(1-t)[2m-1+(2m+11)t]f'_{m+2}(t) +$$
$$+ \frac{1}{9}m(m+2)f_{m+2}(t) = \sum_{n=0}^{m} a_{n/3}[(1-t^2)f'_{m-n}(t) - \frac{2}{3}(m-n)f_{m-n}(t)]. \qquad (6)$$

which is obtained thereby, the author comes to the conclusion that in (5) one just has to sum up over the even indices. Further on he states that

$$U_0(x, y) = f_0(t) = B_0 t^{1/6} F(1/6, 1/3, 7/6; t) = I_t(1/6, 2/3), \quad (9)$$

holds, where $B_0 \Gamma(7/6)\Gamma(2/3) = \Gamma(5/6)$. By estimation of the other terms one can see that in the neighborhood of the sound line $\eta = 0$ it holds $U = U_0 + O(|\eta|)$.

In order to determine $U(x, y)$ the author uses the set-up

$$\bar{z} = \bar{U}(x, y) = \sum_{n=2}^{\infty} s^{n/3} f_n(t) = \sum_{n=2}^{\infty} (4/3)^{n/3}(-\eta)^{n/2} f_n(t), \quad (11)$$

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An effective solution of Tricomi...

where in order to satisfy the conditions (2) one demands

$$f_2(0) = 0, \quad \lim_{t \to 1} [{}^3/_2 (1-t) f_2'(t) - f_2(t)] = ({}^3/_4)^{1/3}, \qquad (12)$$

$$f_n(0) = 0, \quad \lim_{t \to 1} (1-t)^{(n-2)/3} [n f_n(t) - 3(1-t) f_n'(t)] = 0. \qquad (13)$$

$n = 3,4,5\ldots$ One obtains the system (6) here as well, where now $f_o(t) \equiv 0$. Further on one obtains $f_2(t) = B_2 t^{5/6} F\,(5/3,\ 5/6,\ 11/6;\ t)$ where $2B_2 \Gamma(1/3) \Gamma(11/6) = (4/3)^{1/3} \Gamma(1/6)$, and states that $f_3 = f_5 = f_7 = \ldots \equiv 0$. f_4, f_6,... are obtained successively.

There are 4 Soviet-bloc and 2 non-Soviet-bloc references. The 2 references to English-language publications read as follows: W.G.Vinceti, C.B.Wagoner, NACA Techn. Note, no. 2339, 2588, 2832, (1951-1952); S. Agmon, L.Nirenberg, M.H.Protter, Comm. on Pure and Appl. Math., 4, no. 4, 455 (1953).

PRESENTED: July 17, 1961, by I. N. Vekua, Academician

SUBMITTED: July 11, 1961

Card 4/4

KAPILEVICH, M.B.

Singular Cauchy problems for Chaplygin's equation. Dokl. AN SSSR 146 no.3:527-530 S '62. (MIRA 15:10)

1. Predstavleno akademikom I.G.Petrovskim.
(Boundary value problems) (Integral equations)

BABICH, V.M.; KAPILEVICH, M.B.; MIKHLIN, S.G.; NATANSON, G.I.;
RIZ, P.M.; SLOBODETSKIY, L.N.; SMIRNOV, M.M.;
LYUSTERNIK, L.A., red.; YANPOL'SKIY, A.R., red.
MIKHAYLOVA, T.N., red.

[Linear equations in mathematical physics] Lineinye uravneniia matematicheskoi fiziki. [By] V.M.Babich i dr. Moskva, Izd-vo "Nauka," 1964. 368 p. (MIRA 17:7)

L 23660-65 EWT(d) IJP(c)
ACCESSION NR: AR4046309 S/0044/64/00 08 B055/B055

SOURCE: Ref. zh. Matematika, Abs. 8B294

AUTHOR: Kapilevich, M. B.

...ations of the hyperbolic type with ...

CITED SOURCE: Volzhsk. matem. sb. Teor. ser. vyp. 1, 1963, 77-106

... hyperbolic type equation, Gurs ...

TRANSLATION: In the region $D(0 \le x \le x_0,\ 0 \le y \le y_0)$ the solutions $z(x, y, \beta)$ of the ...

$$L(z, \beta) = z_{xy} + \frac{\alpha}{x} z_x + \frac{\beta}{x} z_y = 0 \text{ in } D, \quad (1)$$

$$z(0, y) = f(y),\ z(x, 0) = 0,\ f(0) = 0, \quad (2)$$

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...960-65
... NR: AR4046309

$z_x(0, y) = \varphi(y), z(x, 0) = 0$ (α and β are constants α > 0) (3)

... given in the paper ... A number of other ... lar the Gurs problem where zero initial data are assigned to an infinitely distant characteristics. I. Shishmarev

SUB CODE: MA ENCL: 00

Card 2/2

ACCESSION NR: AP4012073 S/0020/64/154/002/0258/0261

AUTHOR: Kapilevich, M. B.

TITLE: Approximation of singular solutions for the Chaply*gin equation

SOURCE: AN SSSR. Doklady*, v. 154, no. 2, 1964, 258-261

TOPIC TAGS: transcendental function, higher transcendental function, Direchlet problem, Chaply*gin equation, Cauchy problem, mathematical analysis, Duhamel integral

ABSTRACT: If a singular Cauchy problem

$$z(\theta, 0) = \tau(\theta), \quad z_\eta(\theta, 0) = \nu(\theta), \quad \eta = -(^3/_2\sigma)^{2/3},$$

is examined for the Chaply*gin equation

$$z_{\theta\theta} - z_{\sigma\sigma} - b(\sigma)\, z_\sigma = 0, \quad b(\sigma) = [\ln \sqrt{K(\sigma)}]_\sigma = \sum_{n=0}^{\infty} b_n \sigma^{4n-1}$$

ACCESSION NR: AP4012073

in the domain $\sigma \geq 0$ and its solution $z(\theta, \sigma)$ is sought in the integral form

$$z(\theta, \sigma) = \int_{-\infty}^{+\infty} G(\theta - \alpha, \sigma)\, v(\alpha)\, d\alpha + \int_{-\infty}^{+\infty} \bar{G}(\theta - \alpha, \sigma)\, v(\alpha)\, d\alpha,$$

then $G(\theta, \sigma)$ and $\bar{G}(\theta, \sigma)$ can be approximated in the vicinity of the line $\sigma = 0$ by the series

$$G(\theta, \sigma) = \sum_{n=0}^{\infty} G_n(\theta, \sigma), \quad \bar{G}(\theta, \sigma) = \sum_{n=0}^{\infty} \bar{G}_n(\theta, \sigma),$$

in which $G_0 = \bar{\gamma}_1 \sigma^{2/3} r^{-5/3}$ and $\bar{G}_0 = -\gamma_2 r^{-1/3}$ are the values for the roots of G and $\bar{G}$ for the case $b(\sigma) = 1/3\, \sigma$, $G_1 = -3/4\, b_1 (\sigma^{2/3} G_0 - \bar{\gamma}_2 r^{1/3})$, $G_2 = c_0 \sigma^{4/3} G_0 + c_1 \gamma_2 \sigma^{2/3} r^{-1/3} + 4c_2 \bar{\gamma}_1 r^{1/3}$, $G_3 = 2D_0 \sigma^2 G_0 + 2D_1 \bar{\gamma}_2 \sigma^{4/3} r^{-1/3} + 8D_2 \bar{\gamma}_1 \sigma^{2/3} r^{1/3} + 2D_3 g_3 (\theta, \sigma)$, and the functions

Card 2/4

ACCESSION NR: AP4012073

G_n (n = 1,2,3) have the form $\bar{G}_1 = -3/4 b_1 \sigma^{2/3} \bar{G}_0$, $\bar{G}_2 = C_0 \sigma^{4/3} \bar{G}_0 + 8/9 A_1 C_2 g_3$, $\bar{G}_3 = 2D_0 \sigma^2 G_0 - 8/5 \gamma_2 D_4 r^{5/3} - 4A_1 D_3 \sigma^{2/3} g_3$. The constants C_n (n = 0,1,2) and D_n (n = 0,1,2,3,4) depend only upon b_1, b_2 and b_3, and the difference $g_3 = \theta [I_{t,2}(7/6, -1/2) - I_{t,2}(5/6, -1/2)]$, $t = r/\sigma$, is denoted by $g_3(\theta, \sigma)$. Each of the functions G_n and $\bar{G}_n$ (n = 0,1,2,...) contains terms converting into infinity on the characteristics $\theta + \sigma = 0$, and it is therefore more advantageous to examine another method of iteration in order to refine the convergence of series (4) near the line $\theta + \sigma = 0$. The values $z = \sigma^{1/6} \chi^{-1} u$ and $\chi = \sqrt[4]{K}$ are substituted into (1), and the following equation is obtained

$$T[u] = u_{\theta\theta} - u_{\sigma\sigma} - \frac{1}{3\sigma} u_\sigma + c(\sigma) u = 0.$$

This equation is then used as the basis for solving some special cases. Orig. art. has: 25 equations.

Card 3/4

ACCESSION NR: AP4012073

ASSOCIATION: Moskovskiy vecherniy metallurgicheskiy institut (Moscow Evening Metallurgical Institute)

SUBMITTED: 16Jul63 DATE ACQ: 14Feb64 ENCL: 00

SUB CODE: MM NO REF SOV: 003 OTHER: 002

Card 4/4

KAPILEVICH, M.B.

A method of base expansions. Dokl. AN SSSR 157 no.1:30-33 Jl '64 (MIRA 17:8)

1. Moskovskiy vecherniy metallurgicheskiy institut. Predstavleno akademikom I.N. Vekua.

L 40039-66 EWT(d) IJP(c)

ACC NR: AP6017269 SOURCE CODE: UR/0140/66/000/001/0079/0088

27
26
B

AUTHOR: Kapilevich, M. B. (Moscow)

ORG: none

TITLE: Transformation operators generated by basic decompositions

SOURCE: IVUZ. Matematika, no. 1, 1966, 79-88

TOPIC TAGS: operations research, parabolic equation, linear differential equation, transcendental function

ABSTRACT: A study is made of transformation operators which may be generated by decompositions of a basis. A form of the problem is stated as follows: in a domain $\Omega[X(0<x<x_0),\ Y(y_0<y<y_1)]$, the function $u(x, y, B_2)$ is sought, for which

$$L_2[u, B_2] = u_{xy} + \frac{a}{x}u_x + \frac{1}{x}B_2(x)u_y = 0,$$

$$u(0, y) = f(y) \in C^a(Y),\ u(x, y_0) = 0,\ f(y_0) = 0,$$

where a is a positive constant, and $B_2(x)$ is bounded and continuous in the interval $X(0<x<x_0)$. In earlier work (Ob operatorakh preobrazovaniya svyannykh s singulyarnymi zadachami Gursa. DAN SSSR, t. 130, No. 3, Str. 487--490, 1960; O

UDC: 517.544

Card 1/2

L 40039-66

ACC NR: AP6017269

singulyarnykh problemakh v okrestnosti nulevoy i beskonechno udalennoy osoboy kharakteristiki. DAN SSSR, t. 137, No. 6, str. 1287--1290, 1961) the author showed that if $B_2(x) = b_2$ = constant, then the solution $u(x, y, b_k)$ ($k = 1, 2$) is related to the equation

$$u(b_2) = \frac{1}{\Gamma(b_2 - b_1)} \sum_{n=0}^{\infty} \frac{(-1)^n}{n!} \left(\frac{x}{a}\right)^n \gamma\left[b_2 - b_1 + n; \frac{a(y - y_0)}{x}\right] D_y^n u(x, y, b_1).$$

The limiting case $y_0 \to -\infty$ may be expressed as

$$u_0(x, y, b_2) = \sum_{n=0}^{\infty} \frac{(b_2 - b_1)_n}{n!} \left(-\frac{x}{a}\right)^n D_y^n u_0(x, y, b_1).$$

The latter two equations are termed decompositions in descending orders about the function $u(x, y, b_1)$ (see S. Bergman. Integral operators in the theory of linear partial differential equations. Ergebisse der Mathematik und ihrer Grenzgebiete. Neue Folge, H. 23, Springer-Verlag, Berlin-Göttingen-Heidelberg, 1961). Analogous formulas for the more general Gurs problem are developed and extended to the study of related types of equations such as singular equations of the parabolic type

$$z_y = z_{xx} + \frac{a}{x} z_x + c(x) z \quad [c(x) < 0],$$

as expressed by V. G. Levich (Fiziko-khimicheskaya gidrodinamika. Fizmatgiz, M. 1959) and others. Orig. art. has: 40 equations.

SUB CODE: 12/ SUBM DATE: 06Jun64/ ORIG REF: 005

Card 2/2 gd

L 43631-66 IJP(c)

ACC NR: AP6021931 SOURCE CODE: UR/0021/66/011/003/0317/0324

31
B

AUTHOR: Kapilevich, M. B. (Moscow)

ORG: none

TITLE: Green-Adamar functions for singular Tricomi problems

SOURCE: Revue roumaine de mathematiques pures et appliquees, v. 11, no. 3, 1966, 317-324

TOPIC TAGS: wave equation, Tricomi problem, Green function

ABSTRACT: The report analyzes Green's functions of two singular Tricomi problems for the generalized wave equation

$$Q[z, a, b] = z_{\sigma\sigma} - z_{\tau\tau} - \frac{a}{\sigma} z_{\sigma} - b^2 z = 0.$$

Formulas evolved indicate that important integrals of the wave equation, such as the Riemann functions, Green functions, and fundamental solutions, can be expressed through confluent hypergeometric series of Humbert and Horn. Some properties of major solutions to the wave equation are analyzed. These include extension of the series beyond limits of their convergence regions, possible generalizations of the evolved algorithms, as well as an analysis of

Card 1/2

ACC NR: AP6021931

an improper integral containing a Bessel function product and coupled to the discussed class of hypergeometric series. Orig. art. has: 26 formulas.

SUB CODE: 12/ SUBM DATE: 20Sep65/ ORIG REF: 003/ OTH REF: 003

Card 2/2

KAPILEVICH, N.B.

Screw-rotary snow plow mounted on a GAZ-63 truck. Avt.dor. 19 no.11:25 N '56. (MIRA 10:10)
(Snow plows)

KAPILEVICH, N.B.; YEFIMCHENKO, N.N.

Tow car with a hydraulic jack. Mashinostroitel' no.4:39 Ap '60. (MIRA 13:6)

(Automobiles--Transportation)

YANYSHEVA, V. S.; SAZONOVA, Z. A.; KAPILEVICH, S. B.

Determination of aluminum with salicylal o-aminophenol in red phosphorus. Metod. anal. khim.reak. i prepar.no. 4:57-59 '62. (MIRA 17:5)

1. Nauchno-issledovatel'skiy institut udobreniy i insektofungisidov.

KUPERMAN, M.Ye.; KAPILEVICH, S.B.; SEREBRYANAYA, R.M.

Electron microscope analysis of the decomposition of apatite with a mixture of phosphoric and sulfuric acid. Khim. prom. 40 no.8:594-595 Ag '64. (MIRA 18:4)

KAPILEVICH, S.B.; SHVARTSMAN, L.A.

Stability of calcium metaphosphate in contact with liquid ferrophosphorus. Trudy NIUIF no.208:122-133 '65. (MIRA 18:11)

KAPILEVICH, Ya.B., polkovnik meditsinskoy sluzhby, dotsent;
POTULOV, B.M., polkovnik meditsinskoy sluzhby, dotsent

Some problems of the organization of medical service to the troops of the 2d and 3d Ukrainian fronts during the Budapest operation; on the 20th anniversary of the defeat of the German fascist army in Hungary and the liberation of Budapest. Voen.-med. zhur. no.2:9-16 '65. (MIRA 18:11)

KAPNILOVICH, Ye. A.

В. Г. [illegible]
А. Н. [illegible]

[illegible]

А. Я. [illegible]

[illegible]

В. В. [illegible]
Е. А. [illegible]
Г. Н. [illegible]
Н. А. [illegible]

[illegible]

Н. С. [illegible]

[illegible]

11 июня
(с 18 до 22 часов)

Н. В. [illegible]

[illegible] СВЧ [illegible]

А. М. [illegible]

[illegible] СВЧ [illegible]

В. Н. [illegible]
В. П. [illegible]
Д. А. [illegible]

[illegible]

А. М. [illegible]

[illegible]

Н. Н. [illegible]
В. Я. [illegible]

Прибор для [illegible]

СЕКЦИЯ ОБЩЕЙ РАДИОТЕХНИКИ
Руководитель Г. А. [illegible]

9 июня
(с 10 до 12 часов)

Report submitted for the Centennial Meeting of the Scientific Technological Society of Radio Engineering and Electrical Communications im. A. S. Popov (VNORIE), Moscow, 8-12 June. 1959

DANILOV, V.K., polkovnik meditsinskoy sluzhby, doktor med. nauk; KAPILEVICH, Ya.B., polkovnik meditsinskoy sluzhby, dotsent

Order and methodology for the evaluation of the situation by the chief of the medical service. Voen.-med. zhur. no. 1: 8-13 Ja '66 (MIRA 19:1)

L 21831-65 EWT(1)/EWG(k)/EPA(sp)-2/EPA(w)-2/... /ASD(f)-3/ASD(p)-3/... 8
...-10/Pi-4 SSD/AFWL/ASD(a)-5/SSD(b)/AEDC(b)/
...(a)/...(gs)/IJP(c) AT S/0057/64/034/012/2120/2128

ACCESSION NR: AP5000834

AUTHOR: Belensov, P. Ye.; Kapin, A. T.; Plyutto, A. A.; Ryzhkov, V. N.

TITLE: Instability of current in separation of charged particles from plasma

SOURCE: Zhurnal tekhnicheskoy fiziki, v. 34, no. 12, 1964, 2120-2128

TOPIC TAGS: plasma, plasma instability, plasma flow, plasma relaxation oscillation, charged particle separation

ABSTRACT: Some results are presented of experimental investigations of stability conditions in a plasma flowing from an orifice under the action of an electric field. Specifically, the case of the separation of the electronic component from plasma is described. Some data concerning the peculiarities of the separation of the ionic components are given. The plasma was generated by a stationary arc in vacuum, between a magnesium cathode and a circular anode, with an arc current range of 25 to 250 amp at voltages up to 15 v. Two orifices, the first of variable diameter (from 0.5 to 2.5 cm) and the second with a fixed diameter of 14 mm, could be put under a voltage difference

Card 1/3

3000834

up to 30 kv over a capacitor. The plasma concentration in the area of the first orifice at zero voltage was about (1 to 3) x 10^{11} particles per cm^3 with an electron temperature between 0.5 and 1.0 ev. The arrangement made it possible to maintain a quasi-stationary field condition at a slowly changing voltage difference. The different characteristics of plasma flow—the stationary flow, the transitory regime, and the unstable flow—were distinguished. The first displays the dependence of the current only on the fluctuation of the arc. The transitory regime is characterized by the possibility of relaxation oscillations, which may attenuate; the current does not depend appreciably on the inter-orifice voltage. With the unstable flow, modulation of the current between the orifices takes place within the whole range of applied inter-orifice voltages; the mean current value increases slowly with the voltage. The transition from one regime to [illegible] be effected by a change of the arc current and by the initial voltage applied to orifices, i. e. initial field strength. Both possibilities were investigated and the results plotted. The dependencies of the form, period, and amplitude of the relaxation oscillations were studied in some detail. The relationships are

2 3

ACCESSION NR: AP5000834

discussed in some detail and analytical expressions proposed. Orig. art. has: 9 figures and 3 formulas.

ASSOCIATION: none

SUBMITTED: 12Dec63

ENCL: 00

SUB CODE: ME, EM

NO REF SOV: 012

OTHER: 002

ATD PRESS: 3166

Card 3/3

PLYUTTO, A.A.; RYZHKOV, V.N.; KAPIN, A.T.

High velocity plasma streams in vacuum arcs. Zhur. eksp. i teor. fiz. 47 no.2:494-507 Ag '64. (MIRA 17:10)

L 13918-65 EWT(1)/EWG(k)/EWT(m)/EPA(sp)-2/...

TITLE: High speed plasma currents in vacuum arcs

SOURCE: Zh. eksper. i teor. fiz., v. 47, no. 8, 1964, 494-507

TOPIC TAGS: vacuum arc, plasma arc, plasma jet, plasma flow, ion ... plasma charged particle ...

This work is a sequel of a mechanism of ambipolar accelera- ...

... arcs. The apparatus ... the arcs are described. The plasma velocities were measured ... made of Mg, Al, Ni, Cu, Ag, Zn, Cd, ... and brass ...

L 13918-65

ACCESSION NR: AP4043623

Cd, Pb) were 5--10 ev, and those of the second group (Mg, Al, Ni, Cu, Ag) were 20--40 ev. The experiments also yielded sufficiently accurate values of the average velocity, the energy spectrum, and the plasma composition. Mass spectroscopy has shown the presence of appreciable amounts of doubly and triply charged ions in plasmas of the second group of metals. A model of the near-cathode region, with a peaked potential in the cathode-spot plasma, is proposed to explain the origin of the high-speed plasma streams. "The authors thank L. I. Chibanova for help with the work." Orig. art. has: 6 figures, 11 formulas, and 3 tables.

ASSOCIATION: None

SUBMITTED: 03Oct63 ENCL: 01

SUB CODE: ME NO REF SOV: 005 OTHER: 018

2/3

ACCESSION NR: AP4043623 ENCLOSURE: 01

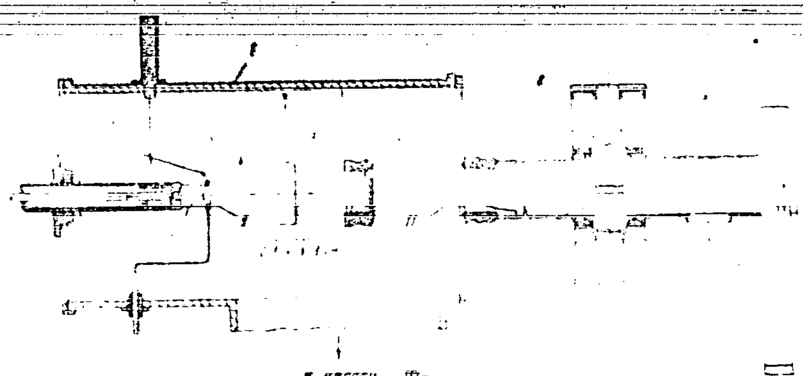

Fig. 1. Diagram of experimental setup:

1 - chamber, 2 - insulator, 3 - cathode, 4 - anode, 5 - tungsten rod, 6 - pendulum, 7 - probe-analyzer, 8 - mass-spectroscopic analyzer, 9 - cathode working surface, 10 -disc, 11 - aperture, 12 - aperture, 13 - screen

Card 3/3

BELENKOV, F.Ye.; KAPIN, A.T.; PLYUTTO, A.A.; RYZHKOV, V.N.

Current instability due to the separation of charged particles from a plasma. Zhur.tekh.fiz. 34 no.12:2120-2128 D '64.

(MIRA 18:2)

BREZGUNOV, K.V.; MUKHAMEDZHANOV, M.; KAPIN, V.V.; SOKOLOV, Ye.P., inzh. (g.Vil'nyus); CHAYKIN, G.V.; ISHUTIN, V., dorozhnyy master

Letters to the editor. Put' put.khoz. no.9:46-47 S '59. (MIRA 12:12)

1. Zamestitel' nachal'nika distantsii puti, g.L'vov (for Brezgunov). 2. Zamestitel' nachal'nika distantsii puti, st. Zhana-Semey, Kazakhskoy dorogi (for Mukhamedzhanov). 3. Starshiy doroshnyy master, st.Shar'ya, Severnoy dorogi (for Kapin). 4. Starshiy doroshnyy master, st.Millerovo, Yugo-Vostochnoy dorogi (for Chaykin). 5. Putevaya mashinnaya stantsiya-77 (PMS-77), st.Sukhoye, Oktyabr'skoy dorogi (for Ishutin). (Railroads)

KAPINA, N. P.

Kapina, N. P. - "New fabrics for dress shoe tops", Nauch.-issled. trudy (Tsentr. nauch.-issled. in-t khlopchatobumazh. prom-sti) Issue 2, 1949, p. 59-66.

SO: U-4110, 17 July 53, (Letopis 'Zhurnal 'nykh Statey, No. 19, 1949).

EXCERPTA MEDICA Sec 13 Vol 13/8 Dermatology Aug 59

2097. AETIOLOGY AND TREATMENT OF VITILIGO (Russian text) - Kapina S. Kh. Med. Inst., Tashkent - From the Symposium: VOPR. DERM. I VENER. (Tashkent) 1957, 6 (95-102)

Eighty-six cases of vitiligo (54 male and 32 female) were under observation. Twenty-four patients had goitres, 6 hyperthyroidism, one hypothyroidism and 4 were euthyroid. Thus, 40% of the patients had changes in the thyroid gland, while 50% of the patients had general endocrine disturbances. Among 33 examined cases the blood calcium level was elevated in 25, normal in 8; blood sugar and chlorides were within normal limits. Histologic and pathologic findings showed atrophic and dystrophic changes in the epidermis, dermis and the nerve fibres, also absence or pronounced decrease in pigmentation in the basal cell layer. The treatment consisted of ultraviolet rays, administration of arsenic perorally or by injection, i.v. injections of a 0.25% solution of novocaine (from 3-4 ml. to 10 ml., the whole course consisting of 20 injections), pin-prick applications of the same solution of novocaine to the vitiligo patches (30-40-60 ml. per application, repeated 6-8 times), and homeopathic doses of iodine as indicated. The course of treatment needs to be repeated. Mashkilleison Jr - Moscow (S)

EXCERPTA MEDICA Sec 13 Vol 13/8 Dermatology Aug 59

2159. PSEUDOXANTHOMA ELASTICUM (Russian text) - Kapina S. Kh. Med. Inst., Tashkent - From the symposium: VOPR. DERM. I VENER. (Tashkent) 1957, 6 (217-221) Illus. 3

A 43-year-old female patient had a pseudoxanthomatous rash on the chin, neck, in the axillary and cubital folds, on the forearms, abdomen, the external genital organs, the perineum and on the ribs. Degenerative changes of the ocular fundi with angioid streaks could be observed at the same time.

Mashkilleison Jr - Moscow (S)

KARINCHEV, N.

Case of keratoconjunctivitis vernalis treated surgically with a new approach. Khirurgiia, Sofia 10 no.6:552-554 1957.

1. (Iz ochnoto otdelenie pri Obedinenata gradska bolnitsa v gr. Chirpan).

(KERATOCONJUNCTIVITIS, surg.

(Bul))

KAPINCHEV, N.

Two cases of conjunctival moniliasis. Khirurgiia, Sofia 10 no.9: 842-844 1957.

1. (Iz ochnoto otdelenie pri Obedinenata gradska bolintsa; Chirpan).
(MONILIASIS, case reports,
conjunctiva (Bul))
(CONJUNCTIVA, diseases,
moniliasis, case report (Bul))

KAPINCHEV, St.

[redacted]

Considerations on utilisation of Latin terminology and on errors in its use. Khirurgiia, Sofia 8 no.6:551-553 1955.

(NOMENCLATURE,

latin terminol.,errors in use)

KAPINOS, G. Ye.

Kapinos, G. Ye. - "Anomulies in Hyacinthus orientalis L.," Doklady (Akad. Nauk Azerbaydzh. SSR), 1949, No. 1, p. 35-37 - Summary in Azerbaydzhani

So: U-3566, 15 March 53, (Letopis 'Zhurnal 'nykh Statey, No. 13, 1949)

38194. KAPINOS, G. YE.

Iz nablyudeniy po fenologii tyul'pana na Apsherone. (Botan. sad pri Botan. in-te im, Komarova Akad. nauk Azerbaydsh. SSR). Byulleten(Glav. botan. sada, vyp. 4, 1949, s. 67-69

KAPINOS, G. Ye.

Kapinos, G. Ye. - "Embryological investigations of Cerasus Bessayi Bail", Trudy Botan. in-ta (Akad. nauk Azerbaydzh. SSR), Vol. XIV, 1949, p. 123-44, (Resume in Azerbaijani), - Bibliog: 16 items.

SO: U-4110, 17 July 53, (Letopis 'Zhurnal 'nykh Statey, No. 19, 1949).

APPROVED FOR RELEASE: 06/13/2000 CIA-RDP86-00513R000520420017-0"

KAPINOS, G.Ye.; RAGIMOV, M.I.

Morphology of the inflorescence of Cynara scolymus L. Izv.AN Azerb. SSR no.11:105-113 '56. (MLRA 10:2)
(Inflorescence)

USSR/Cultivated Plants - Ornamental. M

Abs Jour : Ref Zhur Biol., No 18, 1958, 82595

Author : Kapinos, G.Ye.

Inst : Institute of Botany AS AzerbSSR

Title : Narcissi Apsheron

Orig Pub : Tr. In-ta botan. AN AzerbSSR, 1957, 20, 133-163

Abstract : A study of narcissus varieties was carried out during the period 1945-1955 at the Botanical Garden of the Institute of Botany of the Academy of Sciences of Azerbaydzhan Soviet Socialist Republic. For this purpose, the entire collection numbering 105 specimens was divided into 11 groups according to the 1950 international classification of narcissi. Description of individual varieties was carried out according to a diagram covering 20 points. Cited is a detailed characteristic of 40 of the most

Card 1/2

TUTAYUK, Valida; KAPINOS, G.Ye., red.; DOLGOV, V., red.izd-va

[Structure of double flowers] Stroenie makhrovykh tsvetkov. Baku, Izd-vo Akad.nauk Azerbaidzhanskoi SSR, 1960. 226 p. (Flowers—Morphology) (MIRA 13:7)

KAPINOS, G.Ye.

Embryological investigation cultivated species of the genus Narcissus L. Trudy Inst. bot. AN Azerb. SSR 22:5-16 '60. (MIRA 14:2)
(Narcissus) (Botany--Embryology)

KAPINOS, G.Ye.

Flowering, pollination, and embroyology of Sternbergia lutea (L.) Ker.-Gawl. and S. fischeriana (Herb.) Roem. Bot.zhur. 45 no.7: 1044-1055 Jl '60. (MIRA 13:7)

1. Institut botaniki Akademii nauk Azerabaydzhanskoy SSSR, g. Baku.

(Azerbaijan--Sternbergia) (Sterility in plants)

KAPINOS, G.Ye.; KAGRAMANOVA, F.

Morphological and embryological study of the narcissus. Izv. AN Azerb. SSR. Ser. biol. i med. nauk no.2:3-12 '61. (MIRA 14:6)

(NARCISSUS)

KAPINOS, G.Ye.

Morphology of the bulb of Narcissus L. Dokl.AN Azerb.SSR 18
no.1:65-69 '62 (MIRA 15:3)

1. Institut botaniki AN AzSSR. Predstavleno akademikom
AN AzSSR I.D.Mustafayevym.
(Narcissus) (Bulbs (Botany))

KAPINOS, G.Ye.; KAGRAMANOVA, F.V.

A new multichromosomal form of Sternbergia fischeriana (Herb.) Roem.
Dokl.AN Azerb.SSR 17 no.9:813-817 '61. (MIRA 15:3)

1. Institut botaniki AN AzSSR. Predstavleno akademikom AN AzSSR
I.D.Mustafayevym.
(Azerbaijan--Sternbergia) (Chromosome numbers)

KAPINOS, G.Ye.

Morphogenesis of Sternbergia on the Apsheron Peninsula. Trudy Inst. bot. AN Azerb. SSR 23:23-50 '62. (MIRA 16:2)
(Apsheron Peninsula—Sternbergia)
(Botany—Morphology)

KAPINOS, G. YE.

Dissertation defended in the Botanical Institute imeni V. L. Komarov for the academic degree of Doctor of Biological Sciences:

"Biological Basis for Growing Bulbous and Tuber Plants in Apsheron."

Vestnik Akad Nauk No. 4, 1963, pp. 119-145

KAPINOS, G.Ye.

Sternbergia W. et R. in the flora of Tajikistan. Dokl. AN Azerb. SSR 20 no.7:51-52 '64. (MIRA 17:11)

1. Institut botaniki AN AzerSSR. Predstavleno akademikom AN AzerSSR N.K. Abdullayevym.

KAPINOS, G.Ye.

Cytoembryological analysis of the sterility in Crocus sativus L.
Izv. AN Azerb. SSR. Ser. biol. nauk no.1:15-24 '65.
(MIRA 18:5)

KAPINOS, Galina Yeleseyevna; KARYAGIN, I.I., red.

[Biological characteristics of the development of bulbaceous and tuberous plants on the Apsheron Peninsula] Biologicheskie zakonomernosti razvitiia lukovichnykh i klubnelukovichnykh rastenii na Apsherone. Baku, Izd-vo AN Azerb.SSR, 1965. 238 p. (MIRA 18:8)

1. Chlen-korrespondent AN Azerb.SSR (for Karyagin).

BOL'SHAKOV, G.I.; KAPINOS, I.I.

Feed of the petroleum products to the space under the arch of the oven chamber. Koks i khim. no.8:21-23 '62. (MIRA 17:2)

1. Keremovskiy koksokhimicheskiy zavod.

S/123/60/000/014/005/005
A004/A001

Translation from: Referativnyy zhurnal, Mashinostroyeniye, 1960, No. 14, p. 290, # 74731

AUTHORS: Kapinos, V. I., Il'chenko, O. T.

TITLE: On the Problem of Determining the Thermal Contact Resistance of Mixed Pairs

PERIODICAL: Tr. Khar'kovskogo politekhn. in-ta, 1959, Vol. 19, pp. 217-223

TEXT: The authors investigate the thermal resistance of contact surfaces of mates of different materials. Since the thermal resistance of the contact layer of the most widespread classes of surface finish (average height of micro-roughness = 2 - 15 μ) is equivalent to that of a metal layer with a thickness between 1 and 15 mm, considerable temperature gradients arise only during great heat flows which pass the contact layer, e. g. in artificially cooled units of steam and gas turbines. The thermal resistance of specimen pairs of the following materials were investigated on a special test installation: ЭЖ-1 (EZh-1) - ЭЯ1-Т (EYa1-T); EZh-1 - Ст. (St)45; St.45 - EYa1-T; St.45 - Д16-Т (D16-T);

Card 1/2

APPROVED FOR RELEASE: 06/13/2000 CIA-RDP86-00513R000520420017-0"

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A004/A001

On the Problem of Determining the Thermal Contact Resistance of Mixed Pairs

ЭИ69 (EI69) - St.45 with a micro-roughness in the range of 2.5 - 10 μ. The tests were carried out at different compressive stresses and temperatures. The authors present a calculation formula for the determination of the thermal resistance of the contact surfaces according to the micro-geometry data of each component, thermophysical characteristics of the materials and magnitude of specific pressure. The formula includes also some factors obtained from processed test data. The calculation errors by this formula amount on the average to 4 - 6% in comparison with experimental points for plane surfaces without micro-roughness, e. g. ground on the plate. For milled surfaces, the formula gives an understated value of the contact layer thermal resistance.

N. E. R.

Translator's note: This is the full translation of the original Russian abstract.

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Translation from: Referativnyy zhurnal. Elektrotekhnika, 1959, Nr 4, p 29 (USSR)

AUTHOR: Kapinos, V. M.

TITLE: Heat Transfer From the Disks of Air-Cooled Gas Turbines

PERIODICAL: Tr. Khar'kovsk. politekhn. in-ta, 1957, Vol 24, pp 111-133

ABSTRACT: Heat transfer from the rotating disks of a gas turbine to a radially oriented cooling air stream has been experimentally investigated. Experimental conditions were set by these independent parameters: disk rpm, temperature, air pressure and discharge, and gap width; the experiments have been conducted on disk models. Most experiments were devoted to investigating the relation Nu = f(Re). A generalized criterial curve of heat-transfer factor vs. the Re number, disk dimensions, and its heat conductance has been deduced. Intensification of the heat transfer can be explained by a higher stream turbulence in the movable-wall diffuser channel.

V.S.P.

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SOV/143-58-9-13/18

AUTHOR: Kapinos, V.M., Candidate of Technical Sciences; Il'chenko, O.T., Engineer

TITLE: Heat Conductivity of a Layer, Formed Through Projections of Surface Roughness (Teplovaya provodimost' sloya, obrazovannogo vystupami sherokhovatosti)

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy - Energetika, 1958, Nr 9, pp 77-89 (USSR)

ABSTRACT: When two rough surfaces are placed together, there is direct contact only between individual projections of the surface roughness. Consequently, the actual contact surface is always essentially smaller than nominal one (of the order 10^{-2} - 10^{-5} of the nominal one). As a result of the incomplete contact, the thermal conductivity of the metallic contact is commensurate with the conductivity of the gas interlayer. The total conductivity of a layer formed by the roughness projections and filled by a gaseous medium, can be computed on the basis of the assumptions and

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solutions examined in this paper. The author also works out formulae for computing the heat conductivity of a simple contact layer of steam from homologous materials, as well as a formula for determining the contact resistance of various materials. The paper examines the effect on thermal conductivity of roughness, specific compression pressure, the physical properties of materials and the temperature of the contact layer. Each pair of objects was studied at 2-3 temperature values of the contact layer with loads of 40-500 kg/cm^2 (and in special tests up to 1200 kg/cm^2.) In accordance with the accepted method, only one parameter was varied in a test series - specific compression pressure - the average temperature of the contact layer remaining constant. The comparative data resulting from computed and empirical determination of the contact resistance of the mixed pairs confirm the accuracy of the computational formula. Computational errors for the 5 mixed pairs studied did not exceed 10%. Calculation

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according to the formulae indicated gives the minimum thermal resistance of the contact layer, which is conditioned by the micro-roughness. The presence of a macro-uneveness can cause considerable increase in the contact resistance. There are 18 graphs, 1 sectional diagram, 1 table and 10 references, 8 of which are Soviet, 1 English and 1 American.

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